Afesorgbor, Sylvanus Kwaku; van Bergeijk, Peter A.G.

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Sylvanus Kwaku Afesorgbor
Peter A.G. van Bergeijk

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Abstract

Using a gravity model for 35 countries and the years 1995-2006 we estimate the impact of regional trade agreements in Africa (in particular ECOWAS and SADC) and compare this to the a benchmark of North South trade integration (Europe's preferential trade agreement). We find that

- ECOWAS and SADC membership significantly increases bilateral trade flows (and by more than for example preferential trade agreements with the EU do),
- SADC membership has a stronger impact compared to ECOWAS and
- that the impact of multi-membership critically depends on the characteristics of the overlapping RTA

We find a positive impact if an additional membership complements the integration process of the original RTA: overlapping memberships had a significant positive effect on bilateral trade within the ECOWAS bloc but it is insignificant for SADC.

Keywords

Sub Sahara Africa, regional economic integration, South-South trade, North-South trade intra-regional trade, gravity model, international trade, multi-membership.

Acronyms

ACP	African, Caribbean and Pacific
CE	Conseil de l'Entente
CEAO	Communaute Economique De L'afrique De L'ouest (West Africa Economic Community)
CILSS	Comité permanent Inter-Etats de Lutte contre la Sécheresse dans le Sahel (Permanent Interstate Committee on Drought Control in the Sahel)
COMESA	Common Market for Eastern and Central Africa
CM	Common Market
CU	Custom Union
DOT	Direction of Trade
EAC	Eastern Africa Co-operation
ECA	Economic Commission for Africa
ECCAS	Economic Community Central Africa States
ECOWAS	Economic Community of West Africa States
EDI	Export Diversification Index
IOC	India Ocean Commission
MRU	Mano River Union
PTA	Preferential Trade Agreement
RTA	Regional Trade Agreement
SADC	Southern Africa Development Community
SACU	Southern Africa Custom Union
SSA	Sub Saharan Africa
UDEAO	Union Douaniere entre les Etats de L' Afrique L'Ouest (Custom Union of West African States)
UMOA	Union Monétaire Ouest Africaine (West African Monetary Union)
WACU	West African Custom Union
WAEMU	West Africa Economic and Monetary Union
WAMZ	West Africa Monetary Zone

Multi-membership and the effectiveness of regional trade agreements in West and Southern Africa:
A comparative study of ECOWAS and SADC[1]

1 Introduction

This Working Paper investigates the impact of regional trade agreements (RTAs) in Western and Southern Africa on bilateral trade flows. Trade by and between Sub Saharan Countries is an important and versatile research topic for at least two reasons. Firstly, the continent has a very high density and diversity of RTAs and many African countries are actually member of several different RTAs. According to Yang and Gustav (2005, p.5) RTAs have been proliferating exponentially and Africa is now dense web of RTAs. This implies a lot of variation both across countries and across RTAs thus offering a testing ground for alternative theories on the impact of RTA membership. Secondly, the potential contribution of RTAs in Africa has been contested both on theoretical and empirical grounds. In a nutshell the arguments are that (a) similarities of comparative advantages and structural supply side characteristics imply that intra African trade will have a smaller contribution to bilateral trade compared to North-South RTAs and (b) that the 'spaghetti bowl' of African RTAs creates red tape and inconsistencies that actually hamper intra-regional trade (ECA 2004, p.41, Chacha 2008, p, 10).

Our econometric investigation (a) refutes the first argument for the case of the EU's preferential trade agreement and (b) provides nuance for the second argument: Multi-RTA membership actually strengthens intra-trade if the additional membership complements the integration process of the original RTA, as appears to have been the case in Economic Community of West African States (ECOWAS). In this sense our findings offer support for Rodrik (1998) where he argues that the trade restrictions imposed on the products inside the region constituted an important impediment to growth.

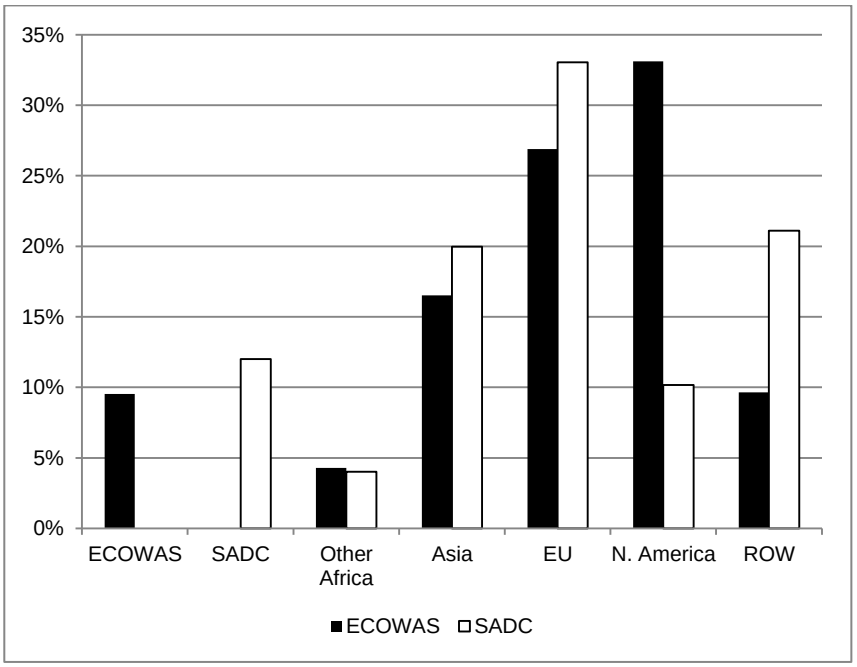
This Working Paper contributes to the literature by offering a comparative analysis of the two major African RTAs: the Economic Community of West Africa States and the Southern Africa Development Community (SADC). ECOWAS consist of 15 West African countries with a combined GDP of US$300 billion and a total population of 290 million (2008). Nigeria accounts for more than 70% of income and more than half of the population. The average growth rate in 2008 in the ECOWAS region was 5%. SADC also consists of 15 countries. The combined GDP for the SADC region was $470 billion in 2008 and the total population was 264 million. South Africa accounts for more than 50% of the region's GDP and accounts for 48% of the total population as at 2008. Average growth rate in the region in 2008 was 6%. The average level of development in terms of per capita GDP of SADC is higher as three middle-income countries (South Africa, Mauritius and Botswana) are members as compared to none in ECOWAS. SADC provides duty-free access

[1] This Working Paper is based on Afesorgbor's 2010 Master's thesis at ISS. Comments by Mansoob Murshed are gratefully acknowledged.

to more than 85% of the traded goods compared to ECOWAS' FTA, although 100% extends to only traditional handicraft and unprocessed goods (ECA 2004).

Lee (2003) argues that regional integration in Africa should take three aspects into account; (a) market integration, (the process of removing any trade discrimination or market barriers between countries), (b) regional integration (whereby a group of countries with similar economic, political and social interests collaborating in achieving these interests) and (c) development integration (the modalities to address the problems created by market integration). Broadly defined regional cooperation often has a stimulating effect on trade and investment and therefore our discussion will sometimes have to cross the 'borders' of the topic of trade agreement per se. For example a regional cooperation strategy may target project or sectoral coordination of economic and physical infrastructures as developed in TIPS (2007). Indeed the initial approach in SADC was more considered with regional co-operation than with market integration (Soderbaum 1996). Also ECOWAS developed a regional strategy and a plan of action to improve economic growth and reduce the poverty level.[2]

FIGURE 1
Trade by Destination ECOWAS and SADC (per cent of total trade, average 2000-2006)



Sources: Authors, compiled based on statistics from ECOWAS and SADC websites[4,7]

[2] One of such strategies is the construction of West Africa Gas Pipeline, which will supply gas to member states from Nigeria (ECOWAS 2006).

Our comparative methodology allows us to investigate whether the negative verdict on African RTAs in the literature is related to the choice of a specific agreement or has a more general bearing. Since ECOWAS and SADC are two completely different clubs that do not have any overlapping membership, a comparison of these two RTAs offers a sound and unambiguous basis for an investigation of the impact of multi-membership. Using a gravity model for 35 countries and the years 1995-2006 we estimate the impact of these two RTAs and compare this to the benchmark of North-South trade integration, in particular the European preferential trade agreement (PTA) granted to ACP countries through the Lomé Convention.[3] Our findings imply that ECOWAS and SADC membership significantly increased bilateral trade flows, and that SADC membership had a stronger impact compared to ECOWAS and that the impact of multi-membership critically depends on the characteristics of the overlapping RTAs. In particular we find a positive impact if an additional membership complements the integration process of the original RTA: overlapping memberships had a significant positive effect on bilateral trade within the ECOWAS bloc but it is insignificant for SADC.

The remainder of this Working Paper is organized as follows. Section 1 offers a short history of economic integration in Sub Saharan Africa (SSA), a snapshot of the spaghetti bowl of RTAs in 2010 and an overview of key characteristics of ECOWAS and SADC, so as to provide an empirical, institutional and historical background for further discussion. Section 2 reviews the theoretical arguments regarding African RTAs and discusses the empirical literature. Section 3 introduces our tool of analysis (the gravity model) and our data set and motivates our methodological choices and empirical operationalization. Section 4 presents and discusses the empirical findings including extensive sensitivity analyses. Section 5 draws conclusions.

2 Regional economic integration in Sub Saharan Africa

We start our discussion by taking a look at the history of regional economic cooperation in Africa both to provide an empirical and historical back ground and to give an overview of the status of regional integration initiatives at the end of 2010. Then we take a specific look at ECOWAS and SADC, considering (overlapping) memberships and the structures and institutions of the regional integration schemes. We also analyse intra-regional trade and compare this to extra-regional trade.

2.1 Short history of economic integration

The history of regional economic integration in Sub Saharan Africa (see Nyirabu 2004) dates back to the 1950s, when pioneering leaders such as Nkrumah (Ghana), Toure (Guinea), Nasser (Egypt), Kaunda (Zambia) and Nyerere (Tanzania) already proposed a regional integration scheme for the

[3] ECOWAS and SADC are South-South RTAs; their PTA with the EU is a North-South RTA.

African continent. At that time however, the majority of African leaders considered this plan to be much too ambitious and thus embarked on an integration course based on sub-continental regional groupings. Serious efforts in the 1970s culminated in the 1980 Lagos Plan of Action that stimulated African countries to establish sub-regional economic blocs.

2.1.1 Economic Integration in West Africa

Already in 1959, the Francophone West African countries comprising of Benin, Ivory Coast, Mali, Mauritania, Niger, Senegal and Upper Volta signed the convention that established the West African Custom Union (WACU), but the customs union failed to stimulate trade (possibly due to technical inadequacies in the convention) which led to a new convention that established the Union Douaniere entre les Etats de L' Afrique l' Ouest (UDEAO) in 1966. Again, however, member countries failed to abide by the principles and UDEAO's Secretary-General in 1972 announced the Union's termination (Ezenwe 1983). Despite the political difficulties, the Francophone West Africa countries continued their efforts and in April 1973, the Communaute Economique De L'afrique De L'ouest (CEAO) was formed as a follow up for UDEAO, basically build around UDEAO's monetary bloc, the Union Monétaire Ouest Africaine (UMOA) that had adopted the CFA Franc as a common currency. At the conference of Heads of State in January 1994, a decision was made to merge UMOA and CEAO into one francophone regional bloc, WAEMU (Soderbaum 1996).

ECOWAS was established in May 1975 by 15 West Africa countries. According to the Treaty of Lagos that established ECOWAS, the main aim was to foster and promote co-operation and development of the member states.[4] The main channels for the realization of that aim was through the harmonisation and co-ordination of national policies in areas of economic, social, cultural and political activities. ECOWAS as a regional bloc envelops the Francophone and Anglophone sub-regional blocs, WAEMU, which comprises of the seven Francophone member states and the West African Monetary Zone (WAMZ), comprising of five Anglophone countries. In order to work into the direction of an economic and monetary union, the Treaty of Lagos was revised in July 1991 and intra-trade was to be stimulated by means of a common market which would take the following into consideration:

1. the liberalization of trade by the abolition, among Member States, of customs duties levied on imports and exports, and the abolition among Member States, of non-tariff barriers in order to establish a free trade area at the Community level.
2. The adoption of a common external tariff and a common trade policy *vis-a-vis* non-member countries.
3. The removal of barriers to free persons, between Member States, of obstacles to the free movement of goods, service and capital, and to the right of residence and establishment.

[4] http://www.comm.ecowas.int/sec/index.php?id=treaty&lang=en, accessed 12/04/2010

Table 1 summarises the membership of regional integration initiatives in West Africa and their current status.

TABLE 1
Regional integration initiatives in West Africa

Community	Members	Ultimate aims and objectives	Current status
ECOWAS	Ghana, The Gambia, Sierra Leone, Nigeria, Guinea, Togo, Benin, Cote d'Ivory, Senegal, Mali, Liberia, Cape Verde, Burkina Faso, Niger, Guinea Bissau	Full Economic and Monetary Union	-Notified to WTO -Tariffs removed on unproessed goods and traditional handicraft. -Full elimination on tariffs on industrial good started by Benin -Abolished entry and visa requirements
WAEMU	Togo, Benin, Cote D'Ivorie, Senegal, Mali, Burkina Faso, Niger, Guinea Bissau.	Full Economic Union	-Notified to WTO -Custom union achieved -Business laws harmonised -Macroeconomic policy in place
WAMZ	Ghana, The Gambia, Sierra Leone, Nigeria, Guinea	Single Currency	-Not notified to WTO -Macroeconomic convergence in place -Macroeconomic policy in place.
Conseil de l'Entente (CE)	Benin, Togo, Cote D'Ivorie, Niger, Burkina Faso	Promoting economic and political cooperation	-Not notified to WTO -initially a political discussion forum -Activities carried out are strictly economic
Mano River Union (MRU)	Liberia, Guinea, Sierra Leone	Multisectoral integration	-Not notified to WTO -intra-union FTA established -No progress towards CU and CET -intra-regional trade below 1% -Some joint infrastructure project completed
Comité permanent Inter-Etats de Lutte contre la Sécheresse dans le Sahel (CILSS)	Mali, Niger, Senegal, Burkina Faso, Gambia, Cape Verde	Coordinating Sahelian developmental programmes	-Not notified to WTO -Co-operating in establishing regional projects Activities are not directly linked to trade promotion

Sources: Compilation of Soderbaum 1996, ECA 2004, and WTO website[5]

[5] http://rtais.wto.org/UI/PublicAllRTAList.aspx, accessed 01/11/2010

2.1.2 Economic integration in Southern Africa

Economic integration in Southern Africa actually dates back as far as 1889, when the Cape Colony and landlocked Orange Free State[6] formed a CU later extended to include Lesotho (1891) and with Botswana (1893). The Union of Southern Africa developed into the Southern Africa Currency Union (SACU). Although SACU was already formed in 1910, the agreement establishing the CU was ratified in 1969, after which there have been a series of renegotiations, mainly because smaller members felt there were inadequacies in the agreement which did not serve their interests. For instance, there were no provisions for sharing custom revenues (Soderbaum 1996). SACU operated as a free trade agreement for intra trade and had common external tariffs. In 1974, the Rand Monetary Area was formed by South Africa, Lesotho and Swaziland. The SACU members (except Botswana) used the South African national currency, the Rand, alongside their own national currencies (Warin et al. 2009).

In April 1980 Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zambia and Zimbabwe signed the Lusaka Declaration that established Southern African Development Coordination Conference (SADCC). Its main objectives were to reduce the economic dependence on South Africa and promote regional cooperation (Soderbaum 1996).

Southern African states had a preferential trade agreement with Eastern African nations that in 1981 was transformed into COMESA, an RTA under the auspices of the Economic Commission for Africa (ECA). However, not all Southern African states ratified the treaty establishing COMESA: South Africa, Namibia and Botswana are not members. Additionally, SADC has established membership in COMESA as incompatible with SADC membership and has solicited its members to secede from COMESA. As a result, COMESA has not significantly influenced intra-regional trade (Warin et al. 2009).

The 1992 Windhoek meeting of the SADCC decided to transform the conference into a more formalised and integrated community. Thus, SADC is a continuation of SADCC. The organizational structure of SADC was built basically on that of SADCC. The Windhoek Declaration listed three main objectives as summarised by Soderbaum (1994, p. 48):

1. Deeper economic cooperation and integration, on the basis of balance, equity and mutual benefit, providing for cross-border investment and trade, and freer movement of factors of production, goods and services across national borders.
2. Common economic, political and social values and systems, enhancing enterprise and competiveness, democracy and good governance, respect for rule of law and the guarantee of human rights, popular participation and alleviation of poverty.
3. Strengthening regional solidarity, peace and security, in order for the people of the region to live and work together in peace and harmony.

As a step towards enhancing deeper regional integration and promoting intra-regional trade, SADC has an established Institutional Framework for FTA and Protocol on Trade, which formed the legal basis for FTA. This Protocol was

[6] Cape Colony was established by the Dutch East Indian Company in 1652; Oranje Vrijstaat was an independent Boer republic in southern Africa.

signed in 1996 and it commits the member states to eliminate existing trade barriers, harmonise trade procedures and documentation. There is also Trade Negotiation Forum which is responsible for trade negotiation and overseeing the effects of the trade liberalisation (SADC 2008).

Table 2 provides details on membership, objectives and current status of the regional blocs in Southern and Eastern Africa.

TABLE 2
Regional integration initiatives in Southern Africa

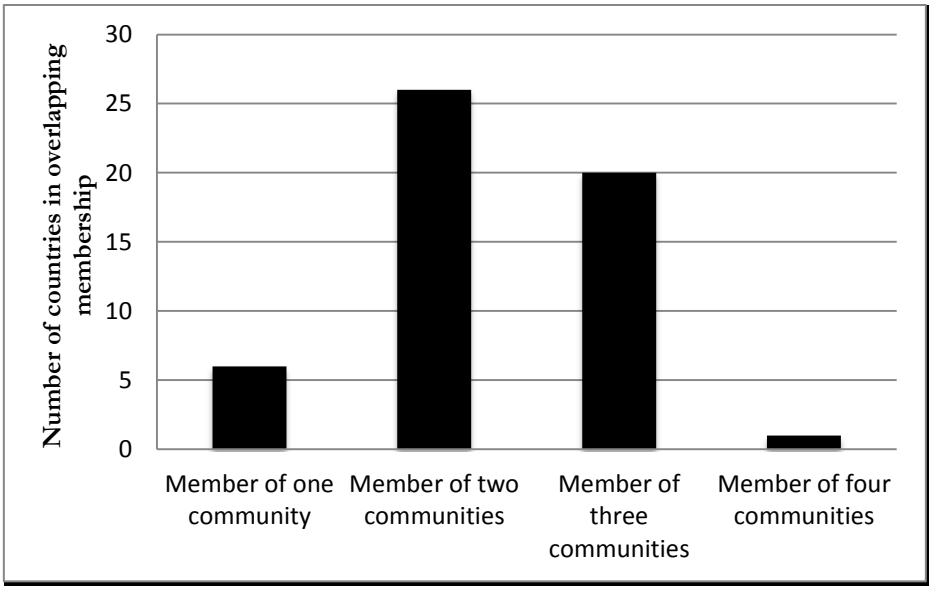
Community	Members	Objectives	Current status
SADC	Angola, Botswana, DR Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe	To establish EMU	-Notified to WTO -Free trade area launched. -Power pool in place - Peace and security mechnism in place -Macroeconomic convergence in place
SACU	Botswana, Lesotho Namibia, South Africa Swaziland	To establish a CU	-Notified to WTO -Custom union and a monetary union established
COMESA	Burundi, Comoros, Djibouti, DR Congo, Egypt, Eritrea, Ethiopia, Kenya, Libya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Swaziland, Uganda, Zambia, Zimbabwe.	FTA	-Notified to WTO -Free trade agreement established and coverage is limited to goods
EAC	Uganda, Kenya, Tanzania, Burundi, Rwanda	CU	. -Notified to WTO -A committee established to review the scope for integration in priority areas
Indian Ocean Commission (IOC)	Mauritius, Seychelles, Madagascar, Comoros	Promoting regional economic cooperation and integration	-Not notified to WTO -established programs to promote regional trade liberalisation
Economic Community of Central African States (ECCAS)	Angola, Burundi, Cameroon, Central African Republic, Chad, DR Congo, Congo, Equatorial Guinea, Gabon, Rwanda, Sao Tome and Principe	Promoting regional economic cooperation -establish a common external tariff	-Not notified to WTO

Sources: see Table 1

2.2 Overlapping Memberships of ECOWAS and SADC

As a consequence of the many initiatives and different fortunes of regional integration initiatives (REI), the African RTA landscape is complex to say the least. West Africa currently consists of six different REIs, with each country belonging to at least two of the six REIs. Niger, Guinea and Burkina Faso have the highest multiple memberships, belonging to four of the regional groupings in West Africa. SADC, like ECOWAS, has majority of SADC member states belonging to at least two of the six regional blocs in both Eastern and Southern Africa. DR Congo holds the highest multiple-membership as it belongs to four different regional groupings

FIGURE 2
Multiple RTA Memberships of SSA Countries



Source: **ECA 2004, p. 40.**

Even though some of the regional groupings' aims are not directly related to promoting intra-regional trade, multiple membership may give rise to duplication and inefficiency. It could be unnecessary because the main focus and objectives of the regional schemes could probably also be amalgamated with the bigger regional blocs. Tables 3 and 4 provide details on multiple memberships of ECOWAS and SADC member states. Multiple membership is defined as the number of REIs to which both the exporter country and importer country belong (the count thus refers to the country-pair or dyads). Multiple membership occurs more often in SADC (63% of dyadic trade flows that occurs among ECOWAS countries are in 'single membership' dyads compared to 48% among SADC countries) but 'excessive' multiple membership (i.e. more than 2 RTAs) occurs more often in SADC.

TABLE 3
Multiple Memberships of ECOWAS and SADC's Members as at 2010

ECOWAS Members	Number	WAEMU	WAMZ	MRU	EC	CILSS
Benin	3	X			X	
Burkina Faso	4	X			X	X
Côte d'Ivoire	3	X			X	
Guinea Bissau	2	X				
Mali	3	X				X
Niger	4	X			X	X
Senegal	3	X				X
Togo	3	X			X	
Gambia	2		X			
Ghana	2		X			
Guinea	4		X	X		X
Sierra Leone	3		X	X		
Nigeria	2		X			
Cape Verde	2			X		
Liberia	2			X		

SADC Members	Number	COMESA	ECCAS	SACU	IOC	EAC
Angola	3	X	X			
Botswana	3			X		X
DR Congo	4	X	X		X	
Lesotho	2			X		
Madagascar	2	X				
Malawi	3	X			X	
Mauritius	2	X				
Mozambique	1					
Namibia	3	X		X		
Seychelles	3	X			X	
South Africa	2			X		
Swaziland	3	X		X		
Tanzania	2					X
Zambia	2	X				
Zimbabwe	2	X				

Source: Based on Table 1 and Table 2

TABLE 4
Single and multi-membership in per cent of dyads, 2010

Number of RTA	ECOWAS (%)	SADC (%)
1	63	48
2	26	45
3	10	7
4	1	-

2.3 ECOWAS and SADC: organization, structure and institutions

The organization, structure and institutions of ECOWAS and SADC blocs are almost similar. According to Lagos Treaty, ECOWAS has seven institutions that perform various functions as stipulated in the Abuja Treaty. The institutions comprise of the Authority of Heads of State and Government; the Council of Ministers; the Community Parliament, the Economic and Social Council, the Community Court of Justice; the Executive Secretariat; the Fund for Co-operation, Compensation and Development; Specialised Technical Commissions. The supreme body is the Authority of Head of States and Government, who is responsible for general direction, control and progressive development of the Community.

Similarly, the SADC Treaty[7] provides the following as the established institutions: the Summit of Heads of State or Government, the Council of Ministers, Commissions, Standing Committee of Officials, the Secretariat, and the Tribunal. The Summit of Heads of State is the supreme policy-making body and it is responsible for overall policy direction and control. The Council of Ministers appoints a Chairman and Vice- Chairman who together with the council oversee the overall functioning and development of SADC. The Standing Committee comprises of members from each member states' Ministry of Finance or Economic Planning, whose main responsibility is to offer technical advisory to the Council of Ministers. The Secretariat is manned by an Executive Secretary, is responsible for the strategic planning, management, and organization of SADC programmes.

Both blocs have specialised Organs, Agencies and Commissions that perform specific functions. For example, they both have a regional development bank, a parliamentary forum, legal tribunals and other specialised agencies. In terms of these Organs and Agencies, ECOWAS seems to have more, perhaps due it being established earlier. Details on these can be accessed from their websites[4,7].

2.4 Intra and extra regional trade

African intra-RTA trade performed better relative to total intra-African trade (ECA 2004). Intra-regional trade for ECOWAS and SADC have followed a similar pattern of intra-African trade (Table 5).

Intra-regional trade as a percentage of total trade in ECOWAS is still relatively low. However, the share of intra trade stood at 3% in 1970 and increased to presently 10%, which indicates that ECOWAS may have promoted intra-ECOWAS trade. Nigeria and Cote D'Ivorie dominate intra ECOWAS trade between the periods 1996-2008, but since 2003 Ghana, Burkina Faso, and Senegal are also becoming important, indicating a move towards an even spread of the benefits arising from the integration process.

[7] http://www.sadc.int/index/browse/page/715#, accessed 12/04/2010

TABLE 5
Intra-RTA trade as percentage of total trade

Years	1970	1980	1990	Average 2001-2008
ECOWAS				
Exports	3.1%	10.6%	8.9%	10%
Imports	3.3%	10.2%	14.9%	13%
SADC				
Exports	-	2.7%	6.9%	12%
Imports	-	3.8%	6.0%	14%

Sources: Yang &Gupta (2004, p.17), averages (calculated based on statistics the blocs websites)[4,7].

Countries that account for the lowest levels and seem not to be improving their shares are countries that have been plagued by conflict. For example Liberia, Sierra Leone, Guinea and Guinea Bissau are the conflict prone member states. The emerging pattern of increasing intra-RTA trade is even stronger in SADC although this is partly driven by the joining of South Africa in 1994 (but note that South Africa which accounts for more than half of the SADC GDP, accounts for only 22% of the total intra-regional trade). Other member states such as Angola, Mozambique, Tanzania, Zambia and Zimbabwe individually account for more than 5%. This suggests that growth in intra-regional trade may bring about equitable development, could possibly stimulate regional convergence and would provide a platform for smaller countries to grow in tandem with more economically advanced member states through an internally promoted trade.[8]

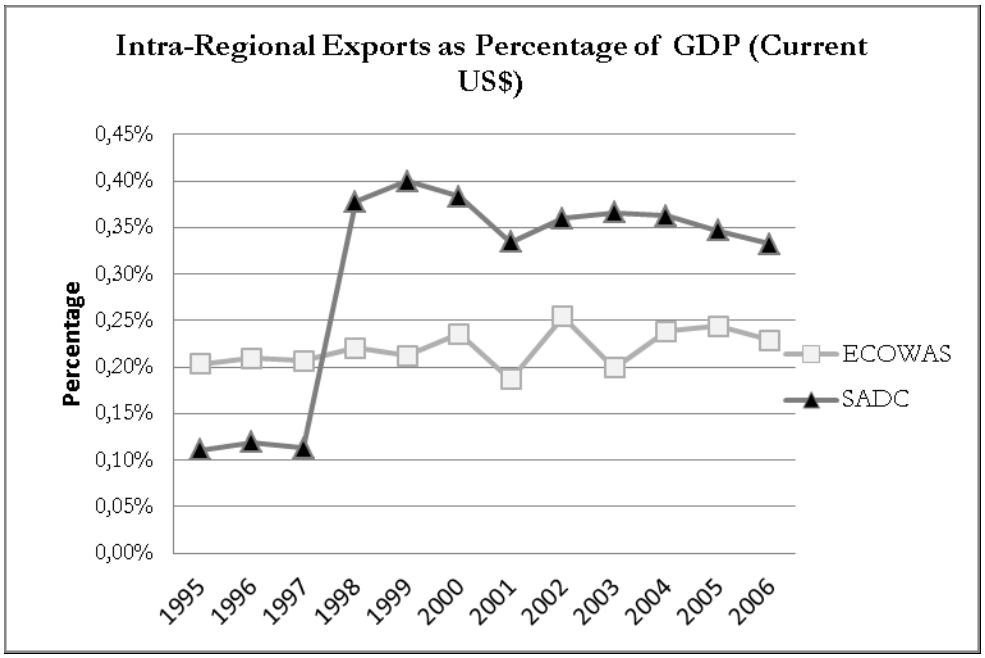
The structure of intra-regional trade may to a large extent explain why SADC is performing better than ECOWAS. ECA identifies that increased capacity to produce and trade manufactured goods as a potential for the success of RTAs. Intra-regional manufactures exports (1994-1999) as a percentage of total exports for ECOWAS and SADC stood at 16% and 60% respectively (ECA 2004). Additionally, the export diversification index (EDI[9]) for SADC is far better than of ECOWAS, however, ECOWAS has been improving its EDI, with this decreasing from 0.83 (2000) to 0.77 (2008), For SADC this stands 5.9 (2008).

With the average growth rate for intra-regional trade more than that of extra-regional trade ECOWAS and SADC increasingly trade more internally than externally in annual growth rate terms. Comparing the intra-regional exports among ECOWAS and SADC indicates that SADC has contributed more to improving bilateral exports among members than with ECOWAS. For instance, between 2000 and 2006, annual average for intra-exports for SADC stands $6,097 million compared to $4,427 for ECOWAS (for the same period).

[8] Surprisingly, Zimbabwe despite the trade sanctions account for about 18% of the SADC intra-exports. One plausible reason could be that as a result of trade sanctions that inhibit trade flow externally; Zimbabwe tends to channel its exports internally through the SADC region.

[9] EDI measures the difference in structure of trade by a country and the world average. The closer to 1 indicates a bigger difference from the world average, which is used as the standard (UNCTAD 2009).

FIGURE 3
Comparative trend of ECOWAS and SADC intra-regional export



Sources: calculations based on IMF Direction of Trade and blocs website .[3&6]

3 Review of literature

Generally speaking, and although recent studies provide more nuance, the literature has been quite negative about regional trade agreements between developing countries and in particular in Africa. Basically three reasons can be discerned that relate to the limited potential for beneficial specialisation, the extent to which trade diversion occurs and overlapping multi-RTA-membership.

3.1 South-South and North-South trade agreements

The key theoretical argument of those who are sceptic about the impact of regional trade agreements in Africa is of course the traditional Heckscher-Ohlin model that shows that countries export goods intensive in the use of abundant factor endowments (Ray 1998). Resource rich African countries will specialise in the production of primary products and are therefore more likely to trade with capital abundant developed countries than among themselves. Thus, South-South RTAs are not expected to contribute significantly to bilateral trade compared to North-South RTAs. Venables (2003) argues that RTA will lead to trade divergence among low income countries, and thus recommend that LDCs are likely to derive potential benefit rather with North-South RTAs. Similarly, Yang and Gupta (2005) are of the opinion that RTAs in Africa have been ineffective in promoting trade and thus recommend that for Africa to increase regional trade, they should focus more on broad-based liberalization. Their assertion can best be captured in the following statement:

> Times series data show that the impact of the RTAs on intra-African trade seems to have been small or insignificant…intra-RTA trade in the major RTAs (SADC, COMESA, ECOWAS, WAEMU and CEMAC) has also grown erratically relative to their trade with the rest of the world, often showing no obvious trend over time (Yang and Gupta 2005, p. 15).

Indeed a North-South RTA would be more valuable if it results in technology transfer from the North to the South that starts the industrialization process in the South (Chui et al. 2002). However, North-South RTAs may also impede industrialisation especially if it results in the loss of policy space to design domestic policies oriented towards flow of FDI or local industrialization (UNCTAD 2007). In this case regional integration may be a strategy to propel export-led growth. Morawetz (1974) discusses how regional integration of developing countries (Central American Common Market) promotes intra-industrial specialization, leading to the emergence of more efficient and larger firms and increased intra-regional trade (from $30million in 1960 to $148 million in 1968). This inter-sectoral specialization effect is a 'training ground' argument (a derivate of the infant industry at the regional level); RTAs help firms to learn to compete efficiently and effectively at the global level (Langhammer and Hiemenz 1991). Balassa and Stoutjesdijk (1975) believe REI would offer substantial benefits to LDCs that are yet to compete favourably in the world market. This will assist them in establishing an efficient production structure because not only is there an increasing discrimination through non-tariff barriers (NTB) on primary exports but also their simple manufactured exports attract higher tariffs in the developed countries (DCs). RTA also reduces the technical and bureaucratic bottlenecks to trade by means of co-ordinated administrative reforms and the dissemination of critical information on trading possibilities (UNCTAD 2007). Thereby, member states can become more competitive.

3.2 Trade Creation and Trade Diversion

A second argument of the sceptics relates to the issue of trade creation versus trade diversion. Basically it is not sufficient for welfare enhancement that a RTA leads to an increase in bilateral trade flow. What matters is the net effect of trade creation and trade diversion (the increase in intra trade flows is a necessary condition though). Trade creation may result from a shift of domestic consumption from high-cost domestic products to low-cost products from a partner country as a result of elimination of trade barriers. Thus, trade between partner countries increases in accordance with international comparative advantage. Trade diversion involves a shift of domestic consumption from a low-cost non-member country to a high-cost member country. Trade diversion may be viewed as a negative consequence of regional integration. For developing countries that tend to have less efficient production methods, the risk that trade diversion outweighs trade creation (and thus negatively affects welfare) should be taken into consideration (Hine 1994). Van Dijk (1992) analyses the necessary conditions under which welfare gains will exceed welfare losses. Firstly, the import demand should be price elastic and price differences between member states should be large while price difference between member states and the world market should be small.

Secondly, if more goods are imported from non-member states before the formation of the regional bloc, there is a high tendency of trade diversion. On both accounts African RTAs would have limited trade creation and probably negative welfare effects.

Gunning (2001) concludes that African RTAs are disappointing in terms of inducing bilateral trade flow. Gunning's assertion is not surprising since this assertion was partly based on the performance of COMESA, citing non-compliance of trade policies among member states as a major contributing factor, in that of the 80% tariff reduction target that was set in 1996 only five out of the 20 members ratified it as 2001. COMESA as regional bloc has being ineffective as some Southern African states have refused to join. SADC has also labelled membership of COMESA as incompatible with SADC (Warin et al. 2009). Thus, the case of COMESA may not be representative for African RTAs. Although, Gunning concludes that African RTAs are better in meeting political rather than economic objectives, he believes that Africa's RTAs can bring about income convergence and become less trade diverting if external tariffs can be reduced as well for non-members.

Ezenwe's (1983), however, argues that the traditional analysis of RTAs is of limited relevance to LDCs essentially if more emphasis is put on static rather the dynamic gains.[10] Jaber (1971) and Deme (1995) argue that these and related dynamic effects are more important for developing countries than the static effects of international specialization. Additionally, increases in the formation of RTAs is being viewed as complementary to trade openness and seen as a step towards a freer global trade (van Dijk 1996). REI has contributed to a positive increase in trade openness in countries that hitherto protected their economies heavily (Swanson 1996). ECOWAS (2006) argues that regional initiatives provide a joint commitment and concerted strategy to fast-tracking the process of tariff elimination, citing WAEMU as an example, in which the member countries have jointly reduced barriers to both intra and extra-community trade (before WAEMU, the average total entry taxes stood at 65%; the current range is between 0% and 22%.

With this discussion in mind we now turn to the econometric studies regarding the impact of African RTAs on trade (Table 6). Deme (1995) finds in his analysis for the years 1975-1991 that (depending on the estimation technology) ECOWAS members trade 0.5 to 1.7 times more than with non-members. Cernat (2001) using a pooled cross section for the years 1996, 1996 and 1998 finds that ECOWAS membership doubles bilateral trade flows *vis-à-vis* non-ECOWAS countries. For SADC, Cernat finds a very strong positive impact, indicating that SADC membership increases intra-trade fold. Carrere (2004) controls for possible endogeneity and studies a trade matrix for 150 countries for the period 1962-1996 and finds ECOWAS and SADC to have contributed to intra-regional trade by a factor of 0.2 and 2.7 times respectively. Although Carere controlled for most of econometric problems, a problem is

[10] Wonnacott and Wonnacott (1981) argue that regional trade agreements are more motivated more by the potential export advantages rather than by static welfare implications.

that the investigation covers a period when most of the member states of these blocs had not yet ratified the free trade protocols.

TABLE 6
Summary of empirical studies on the impact of African RTAs on bilateral Trade

Study	Type of Data	Period	N	Dependent Variable	Regional Blocs	Methodology	Estimates
Deme 1995	Panel data	1975-1991	24	Log imports	ECOWAS	PCS	0.41***
						PCS Time FE	-0.12
						PCS Country FE	0.99***
					WAEMU	PCS	0.62***
						PCS Time FE	0.63***
						PCS Country FE	0.69***
Cernat 2001	Cross section	1994	100	Log exports	ECOWAS	OLS	0.89***
		1996				OLS	0.76**
		1998				OLS	0.50**
		All				PCS	0.82***
		1994			SADC	OLS	1.69***
		1996				OLS	2.15***
		1998				OLS	2.17***
		All				PCS	2.19***
		1994			COMESA	OLS	1.01***
		1996				OLS	1.15***
		1998				OLS	0.96***
		All				PCS	1.13***
Carrere 2004	Panel data	1962-1996	150	Log imports	ECOWAS	Fixed effect	0.20**
					SADC	Fixed effect	1.29***
					COMESA	Fixed effect	0.43
					WAEMU	Fixed effect	1.14***
Couli-baly 2007	Un-balanced Panel	1960-1999	56a 90b		ECOWAS	Semi-parametric approach	Positive and significant
					SADC	Semi-parametric approach	Positive and significant

Notes: *** p<0.01, ** p<0.05, * p<0.1, N= number of countries [a]exporters [b]importers

More recent empirical evidence on trade performance of RTAs between developing countries is provided by Coulibaly (2007). He used a two-step estimation approach of combining gravity model and Kernel regression of estimated trade residuals in evaluating LDCs' RTAs for the period 1960-1999. Coulibaly finds that ECOWAS has had a positive and increasing impact on intra-regional trade over the estimation period; however its impact on exports to the ROW has been negative and decreasing. For SADC, Coulibaly stated that the bloc had a continuous positive anticipation effect five years before the implementation of the treaty establishing SADC. Just like ECOWAS, SADC also had a positive and increasing impact on intra-regional trade. However, its extra-regional trade was estimated to be negative.

3.3 Overlapping multi-RTA membership

One of the intriguing aspects of African regional trade agreements is the extent of overlapping membership. Many authors such as Gunning (2001), Yang and Gupta (2005) and Chacha (2008) have argued that these overlapping

memberships undermine the effectiveness of African RTAs. An example of the argumentation is provided by ECA (2004, p. 41).

> The overlap among regional economic communities also adds to the burdens of member states. A country belonging to two or more regional economic communities not only faces multiple financial obligations, but must cope with different meetings, policy decisions, instruments, procedures, and schedules. Customs officials have to deal with different tariff reduction rates, rules of origin, trade documentation, and statistical nomenclatures. The range of requirements multiplies customs procedures and paperwork, counter to trade liberalization's goals of facilitating and simplifying trade.

In the same vein Chacha (2008) and Yang and Gupta (2005) argue that multiple memberships may be inhibiting the full potential of these regional blocs in stimulating intra-regional trade.[11] Indeed, differences in the rules of origin may undermine the effectiveness of the RTAs by creating a lot of red tape and inconsistencies. Also overlapping and multiple memberships may undercut the member states' consistent commitment by member states which is a necessary condition for the success of any RTA.

It is, however, equally possible that multi-membership offers benefits to countries. These benefits can consist of economic benefits, of economic spill-overs from non-economic treaties and of non-economic benefits. As to the economic benefits of RTAs, Cheng et al (2009: 45) define overlapping membership as a phenomenon whereby one country is involved in more than one RTA. They refer to overlapping membership as a hub and spokes system with the individual country as the hub and the other countries with which it has an overlapping RTA as the spokes countries. In the context of increasing bilateralism, the hub country through multi RTA membership reduces the probability of becoming the victim of trade discrimination from the spokes countries that are non-members of the hub's original RTA. As to the economic spill-overs from non-economic treaties it is important to note that trade agreements form part of a larger set of political international arrangements that bread trust between nations and therefore spill-over effects between different areas may be significant (see, for example, Rose and Spiegel 2010 on the trade and investment effects of environmental treaties[12]). Non-economic spill-over effects may for example emerge in the area of peace economics (van Bergeijk 2009). Murshed and Mamoon (2010) indicate that increasing bilateral trade decreases the tendency of escalation of conflicts among states. REI contributes to conflict reduction and good governance both at intra and inter-state level.[13]

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[11] Chacha (2008) is the only study that provides an estimate of the impact of multi-membership: a one unit of overlap is associated with a reduction in intra-regional import as a percentage of GDP by a factor 0.0022.

[12] Interestingly, multi-membership is quite common in environmental treaties as well.

[13] Noteworthy is ECOWAS' role in establishing a mechanism for prevention, management and resolution of conflicts, peace building and security through its regional security monitoring group (ECOMOG). This institution played a pivotal role in peace and security in Liberia and Togo (ECOWAS 2006). Similarly, SADC has an established Organ on Politics, Defence and Security. This Organ according to Lee (2003) has been instrumental in conflict management in the SADC region. For instance, the admission of DR Congo into SADC was motivated mainly by ensuring

Accordingly, multi-membership may be an instrument to minimize economic vulnerability to protectionist measures, to maximize economic spill-overs from other regional diplomatic arrangements that differ with respect to the non-economic issues that they cover and to maximize non-economic benefits in particular if geographic coverage is important.

In analysing the impact of overlapping memberships in ECOWAS and SADC, there are two main issues. Firstly, whether the other RTAs are major blocs, and secondly, whether the majority members of these other blocs are members of ECOWAS or SADC. ECOWAS member states belong to two major sub-regional blocs WAEMU and West Africa Monetary Zone (WAMZ). Although, these blocs are recognized as different regional blocs, they are all working to achieving the overall objective of the ECOWAS. Additionally, the other regional groupings are not major regional blocs that can compete with ECOWAS.

Conversely, for SADC, Lee (2003) identifies the SACU, COMESA and EAC as posing a challenge to the SADC strategy of market integration. SADC member states share membership with major regional blocs: COMESA, ECCAS and EAC, with majority of the members of COMESA, EAC and ECCAS being non-SADC members. This can possibly bring conflict of interests among the different member states, thus, overlapping membership may negatively affect SADC or contributes to no greater significant impact.

4 Empirical design and data

The design of our econometric investigation is traditional as we use the well-known gravity equation as our main tool. The gravity model is an applied empirical trade model that describes bilateral trade flows. The key drivers in this model are economic mass and distance. Just as in the Newtonian gravity model this trade model assumes that interaction is weaker if distance is larger and stronger when masses are larger. Thus a large country that has substantial production and population will *ceteris paribus* trade more than a small country. Likewise countries that are closer to each other trade more. Often the model also includes a great number of trade resistance factors (such as import tariffs) and trade enhancement factors (such as a common language) that are relevant at the bilateral level (see van Bergeijk and Brakman 2010 for a discussion and many relevant applications of the model). We extend the traditional gravity model as we also include among the explanatory variables a measure for overlapping multi-RTA membership of the trading economies.

The set of the countries that we analyse (see Appendix I for a list of countries) reflects that we want to include all member states of the major African trading agreements and European countries. We analyse ECOWAS and SADC because we want to analyse groups of countries that are involved in regional trade agreements and where multi-membership is an issue but where the groups do not show an overlap. ECOWAS and SADC are completely separate clubs and meet this requirement. The African countries in our dataset

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peace and security. SADC also played an important role in ensuring political stability in Lesotho in 1998.

cover 76% of regional GDP (2008), 69% of its population (2008) and about 70% of its trade (average for 2000-2006). European trading partners are included both to have a benchmark (although an imperfect one as most EU countries are also members of the European Monetary Union) and to be able to compare South-South trade and North-South trade in the context of regional and preferential trading agreements.

In estimating the gravity model, we selected trade flows from the period 1995 to 2006 because memberships did not change in this period (a new membership automatically and by definition increases our dyadic multi-membership score in relevant country pairs so that the impact of RTA membership and multi-membership could not be distinguished). Moreover important changes in the rules and regulations were still in a flux in the early 1990s. For instance, the original ECOWAS (Treaty of Lagos) was revised in 1991 (Abuja Treaty) in order to accelerate the integration process , while SADC became a more formalised integration community in 1992 at the Windhoek Summit, when it was transformed from a Co-ordinating Conference into a Regional bloc.

4.1 Variables and models

The dependent variable is total bilateral trade measured in term of exports. X_{ijt} is total annual merchandise exports in million dollars from country *i* to *j* at time *t*. The use of exports as measure of bilateral trade is to account for the fact most importers especially in these African blocs tend to deliberately under-report their imports as means to avoiding excessive import duties as indicated by Baldwin and Taglioni (2006). The explanatory variables can be subdivided into on the one hand, the variables of interest (a set of dummy variables that measure the respective impacts of a RTA and a Multiple membership variable on bilateral trade flows), and on the other hand, the controlling variables population, distance, land-area, contingency, common currency and GDP. These controlling variables are expected to have meaningful statistical and economic relationship with the dependent variable.

4.1.1 Variables of interest - RTA variables

$ECOWAS_{ijt}$ is a dummy variable with value 1 if *i* and *j* belong the ECOWAS regional bloc at time *t*,, 0 otherwise

$SADC_{ijt}$ is a dummy variable with value 1 if *i* and *j* belong the SADC regional bloc at time *t*, 0 otherwise

EU_{ijt} is a dummy variable with value 1 if *i* and *j* belong to the EU regional bloc, 0 otherwise

$ECOWAS\_EU_{ijt}$ is a dummy variable with value 1 if *i* is an ECOWAS member and *j* is EU member at time *t*,, 0 otherwise

$SADC\_EU_{ijt}$ is a dummy variable with value 1 if *i* is an SADC member and *j* is EU member at time *t*, 0 otherwise

EU_ECOWAS_{ijt} is a dummy variable with value 1 if *i* is an EU member and *j* is ECOWAS member at time *t*, 0 otherwise

EU_SADC_{ijt} is a dummy variable with value 1 if *i* is an EU member and *j* is SADC at time *t*,, 0 otherwise

$Mult\_RTA_{ijt}$ is the number of RTAs country *i* and *j* both belongs to at time *t*,.

4.1.2 Controlling variables

Y_{it} is the Exporting country's GDP measured in million US$ at time *t*

Y_{jt} is the Importing country's GDP measured in million US$ at time *t*

D_{ij} is the geographical distance between country *i* and *j* in kilometres

Pop_{it} is the exporting country's population measured in million at time *t*

Pop_{jt} is the importing country's population measured in million at time *t*

$Cont_{ijt}$ is a dummy variable with value 1 if *i* and *j* share a land border, 0 otherwise

Col_{ijt} is a dummy variable with value 1 if *i* and *j* are colonies or shared a colonial relationship, 0 otherwise

CU_{ijt} is a dummy variable with value 1 if *i* and *j* use the same currency, 0 otherwise

α_t denotes the time fixed effect time dummy

α_{ij} denotes the country pair fixed effect.

ε_{ij} is the error term.

4.1.3 Models to be estimated

Three models will be estimated using Pooled Cross Section (PCS), Random Effects (RE), Fixed Effects (FE) and Hausman-Taylor (HT) estimations.

The first model only captures the effects of the ECOWAS, SADC and EU PTA on bilateral export in comparison to reference category (No RTA). The dummy variables $ECOWAS\_EU_{ijt}$, $SADC\_EU_{ijt}$ capture the impact of EU PTA. EU_SADC_{ijt} and EU_ECOWAS_{ijt} capture exports from the EU to the blocs but do not measure impact of EU PTA as the PTA was not reciprocal under the study period.

$$\begin{aligned}\ln(X_{ijt}) = {} & \alpha_0+\alpha_t+\alpha_{ij}+\beta_1\ln(Y_{it})+\beta_2\ln(Y_{jt})+\beta_3\ln D_{ijt}+\beta_4\ln(Pop_{it})+\beta_5\ln(Pop_{jt})+ \\ & \beta_6 Cont_{ij}+\beta_7 Col_{ij}+\beta_8 Area_i+\beta_9 Area_j+\lambda_1 ECOWAS_{ijt}+\lambda_2 SADC_{ijt}+ \\ & \lambda_3 EU_{ijt}+\lambda_4 ECOWAS\_EU_{ijt}+\lambda_5 SADC\_EU_{ijt}+\lambda_6 EU\_ECOWAS_{ijt} \\ & +\lambda_7 EU\_SADC_{ijt}+\varepsilon_{ij} \end{aligned} \quad (1)$$

The second and the third model measure the impact of multiple membership. The second model focuses specifically on the impact of overlapping membership without considering the differences in overlapping membership within the blocs. The third model takes the differences in overlapping (multiple) membership within the blocs into consideration. Thus, in model 3, we introduce interactive or multiplicative terms between the bloc dummies and the multiple membership variable, in order to distinguish the effect of multiple membership within the two blocs.

$$\ln(X_{ijt}) = \alpha_0 + \alpha_t + \alpha_{ij} + \beta_1 \ln(Y_{it}) + \beta_2 \ln(Y_{jt}) + \beta_3 \ln D_{ijt} + \beta_4 \ln(Pop_{it}) + \beta_5 \ln(Pop_{jt}) + \beta_6 Cont_{ij} + \beta_7 Col_{ij} + \beta_8 Area_i + \beta_9 Area_j + \lambda_1 ECOWAS_{ijt} + \lambda_2 SADC_{ijt} + \lambda_3 EU_{ijt} + \lambda_4 ECOWAS\_EU_{ijt} + \lambda_5 SADC\_EU_{ijt} + \lambda_6 EU\_ECOWAS_{ijt} + \lambda_7 EU\_SADC_{ijt} + Mult\_RTA_{ijt} + \varepsilon_{ij} \quad (2)$$

$$\ln(X_{ijt}) = \alpha_0 + \alpha_t + \alpha_{ij} + \beta_1 \ln(Y_{it}) + \beta_2 \ln(Y_{jt}) + \beta_3 \ln D_{ijt} + \beta_4 \ln(Pop_{it}) + \beta_5 \ln(Pop_{jt}) + \beta_6 Cont_{ij} + \beta_7 Col_{ij} + \beta_8 Area_i + \beta_9 Area_j + \lambda_1 ECOWAS_{ijt} + \lambda_2 SADC_{ijt} + \lambda_3 EU_{ijt} + \lambda_4 ECOWAS\_EU + \lambda_5 SADC\_EU + \lambda_6 EU\_ECOWAS + \lambda_7 EU\_SADC + \lambda_8 (ECOWAS * Mult\_RTA) + \lambda_9 (SADC * Mult\_RTA) + \varepsilon_{ij} \quad (3)$$

4.1.4 A priori expectations and econometric concerns

The null hypothesis is based on the classical model of international trade so that, the a priori expectation regarding equation (1) is an insignificant impact of these blocs on trade, because primarily the members of these RTAs have similar factor endowments. The alternative hypothesis is that the RTAs do have a positive effect on intra trade. Regarding multiple membership equations 2 and 3 test for different aspects of this phenomenon. Equation (2) investigates the general impact of overlapping membership and here the null hypothesis in line with the mainstream literature is that its impact is insignificant or negative, for example, because multiple RTAs create red tape and undermine full implementation of each RTA). Equation (3) enables us to investigate the impact of multiple RTA membership in the context of ECOWAS and SADC, respectively. Again the null hypothesis is that there is no impact (so the interaction terms for ECOWAS and SADC should have comparable signs and significance levels – actually zero or negative). The alternative hypothesis is a bit more complex than those tested in the other equations. Since the underlying RTAs appear to be complementing one another in ECOWAS whereas membership is overlapping in SADC, we expect a positive impact of multiple membership in ECOWAS and a negative impact in SADC.

In estimating the gravity model to assess the impact of RTAs in general on the intra-regional trade, there are two main econometric concerns. First, we may have reverse causality between exports and RTA variables if countries that trade intensively are more likely to form RTAs (Baier and Bergstrand 2007). The African RTAs were, however, formed at a moment in time when intra-regional trade was still at a very low level. In addition, membership of RTAs is by and large determined by geographical factors rather than trade (Straathof et al. 2008). Therefore reverse causality is highly unlikely in our study. Second, unobserved heterogeneity may be a problem in the pooled cross sections in particular since it imposes the restriction that the intercept and slope of the variables are the same irrespective of the year and the trading partners. Imposing such restrictions is unrealistic and will produce biased and inefficient estimates (Cheng and Wall 2005). We will follow Cheng and Wall's recommendation to introduce time α_t and country-pair α_{ij} fixed effects (note that $\alpha_{ij} \neq \alpha_{ji}$ so that we have a FE for both directions of bilateral trade). The

FE estimator controls for the likelihood of unobserved time-invariant heterogeneity within the cross-sectional units (individual countries) and time-invariant omitted variables such as political, ethic, historical and cultural factors.

However, the use of a FE in panel data to forestall the problem of unobserved heterogeneity leads to two main concerns as identified by Hausman and Taylor (1981). Firstly, the differencing away of time-invariant variables (our main concern) and secondly, the FE estimator ignores the possibility of variation across the individuals in the sample. Out of these concerns, the first is relevant for this study as there are number of time-invariant variables in the models. However, Cheng and Wall estimate the effect of the time invariant variables by regressing country-pair fixed effects on the time invariant variables as indicated in equation (4)

$$\begin{aligned}\hat{\alpha}_{ij} = \alpha_0 &+\beta_3 \ln D_{ijt} + \beta_6 Cont_{ij} + \beta_7 Col_{ij} + \beta_8 Area_i + \beta_9 Area_j + \lambda_1 ECOWAS_{ijt} + \\ &\lambda_2 SADC_{ijt} + \lambda_3 EU_{ijt} + \lambda_4 ECOWAS\_EU_{ij} + \lambda_5 SADC\_EU_{ij} + \lambda_6 EU\_ECOWAS_{ij} \\ &+\lambda_7 EU\_SADC_{ij} + \varepsilon_{ij}\end{aligned} \tag{4}$$

With respect to the variables in the models: distance, contingency, and land area are all time-invariant and thus drop out of the equation in a FE estimation. Additionally, the variables of interest measured by The RTA and multiple membership dummy variables are constant by design in the period of investigation since we selected a period in which the countries were members of these RTAs that we consider in this paper.

The Hausman-Taylor (HT) method is used as a robustness check. The applicability of HT method is premised on the main assumption that the country-pair effect is random rather than fixed, mainly because the fixed effect removes the time-invariant explanatory variables (Carrere 2004). The HT method requires that only a subset of the explanatory variables is endogenous or correlates with the pair country random effects. In this vein, many studies that employed HT method, using Hausman over-identification test, identified the GDP and the population variables as the endogenous variables. For instance Carrere (2006), Brun et al. (2002), Carrere (2004) and Egger (2002) all identified the GDP and population variables as the endogenous variables within the gravity equation. With this priori information, these same variables would be treated as endogenous.

4.2 Data sources

We use panel data from the following sources: the International Monetary Fund (IMF) database on the direction of trade (DOT) matrix for export flows from the period 1995 to 2006. Export valuation is based on the United Nation guidelines of free on board (f.o.b), which is the transaction value at the frontier of the exporting country. The data focus on 15 West African, 11 South African and 10 European countries. The SADC member states reduce from 15 to 11 as result of the DOT data summing the trade flows of Botswana, Namibia, Swaziland and Lesotho to that of South Africa. The data on geographical distances, contingency, GDP, population and others are also obtained from the

Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) database. The data on memberships of the RTAs were collated from the blocs' websites.[3&6]

The dataset is a balanced panel with in principle 14,280 (35 x 34 x 12) observations. It consists of symmetric trade (export) flows between 35 countries for a period of twelve years. We have 656 missing values in the dataset so that the total number observations is 13,624 of which 2,992 are zero flows (or 22% of the total available observations.) A breakdown of distribution of the zero flows indicates that 60% of them relate to a pair of countries not in the same RTA. This finding offers some corroborative evidence that a RTA influences the level *and* direction of trade. Note that Section 4.3 provides a detailed sensitivity analysis of the potential impact of leaving the zero flows out.

Table 7 provides descriptive statistics for the average export per different RTAs. ECOWAS_EU denotes average export from an ECOWAS member to an EU member and EU_ECOWAS denotes export from EU member to ECOWAS member and similarly for SADC_EU and EU_SADC. Comparison of the averages can be made in reference to pair of countries both in different RTA denoted by NO RTA (reference category). On average a pair of countries that belong to ECOWAS exports to each other 5 times more than a pair in which one member is an ECOWAS member and the other SADC member. For SADC this is about 12 times more.

TABLE 7
Mean of export (Xijt , million US$)

	Mean	Standard deviation
ECOWAS	15	72
SADC	41	132
EU	17524	18456
ECOWAS_EU	77	259
EU_ECOWAS	87	190
SADC_EU	143	440
EU_SADC	176	653

5 Empirical results

Table 8 summarizes the basic econometric results for the gravity equation (1) estimated with the different estimation techniques. In general the estimated models perform satisfactorily. The coefficients are significant and confirm to *a priori* expectations. Before turning to the variables of interest we take a short look at the control variables. Importer and exporter GDP, importer and exporter Population and Distance between exporter and importer are the core of any gravity analysis as in this case and are significant and have the right sign (only in the FE estimates importer GDP is not significant but it consistently

has the right sign; likewise distance always has the right sign but is not significant in the HT model). The dummy variables for common borders, common currency and historical colonial ties as expected exert a significant positive effect on bilateral trade. Also in accordance with our *a priori* expectations is the finding that large countries tend to trade less. The good performance of the model, including the explanatory power, is in line with Longo and Sekkat (2001, p.13) assertion that "at an empirical level, gravity model analyses have established that trade flows between African countries are not lower than expected."

TABLE 8
Empirical results of the estimation of gravity equation

VARIABLES	Pooled Cross Section	Random Effect	Hausman-Taylor	Fixed Effect
ECOWAS	1.877***	1.775***	1.852***	1.764***
	(0.137)	(0.353)	(0.423)	(0.122)
SADC	1.977***	2.012***	2.410***	2.434***
	(0.133)	(0.415)	(0.343)	(0.128)
EU	1.183***	4.225***	2.992***	3.915***
	(0.226)	(0.562)	(0.775)	(0.115)
ECOWAS_EU	1.154***	2.118***	1.415***	1.338***
	(0.155)	(0.392)	(0.500)	(0.0885)
SADC_EU	1.785***	3.261***	2.504***	2.418***
	(0.153)	(0.394)	(0.512)	(0.0877)
EU_ECOWAS	0.524***	2.162***	1.791***	2.221***
	(0.147)	(0.386)	(0.472)	(0.0748)
EU_SADC	0.0224	1.927***	1.592***	2.050***
	(0.148)	(0.411)	(0.489)	(0.0900)
Contingency	1.816***	2.108***	2.375***	2.093***
	(0.101)	(0.302)	(0.380)	(0.0944)
Colonial ties	1.611***	1.672***	1.424***	1.500***
	(0.0670)	(0.222)	(0.394)	(0.0850)
Common currency	0.936***	0.394***	0.581***	0.422***
	(0.0861)	(0.0750)	(0.107)	(0.0916)
Log distance	-0.388***	-0.369*	-0.223	-0.230***
	(0.0670)	(0.189)	(0.248)	(0.0588)
Log Exporter GDP	1.082***	0.652***	0.457***	0.437***
	(0.0349)	(0.0877)	(0.0651)	(0.119)
Log Importer GDP	0.676***	0.352***	0.145**	0.138
	(0.0341)	(0.0795)	(0.0678)	(0.103)
Log Exporter Population	0.425***	1.017***	2.332***	1.671***
	(0.0582)	(0.161)	(0.294)	(0.558)
Log Importer Population	0.291***	0.818***	2.493***	2.243***
	(0.0578)	(0.151)	(0.310)	(0.549)
Log Exporter Land Area	-0.516***	-0.664***	-1.434***	-1.034***
	(0.0311)	(0.0891)	(0.195)	(0.0133)
Log Importer Land Area	-0.268***	-0.451***	-1.470***	-1.323***
	(0.0309)	(0.0896)	(0.207)	(0.0135)
Constant	-7.152***	0.555	17.62***	28.40***
	(0.867)	(2.472)	(3.691)	(0.580)
Observations	10632	10632	10632	10632
R-squared	0.703			0.682

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1,
time dummies were included but not reported here.

The Hausman test that determines if there was any significant statistical difference between the different estimation methods Table 8 indicates no systematic difference between the FE and the HT estimators.[14] Overall, apart from the distance variable that was statistically insignificant under HT estimator, all FE and HT estimates are robust in terms of magnitude, sign and statistical significance. Hence we conclude that the estimates obtained under FE are robust and valid and in the remainder of this paper we therefore work with the FE model only.

5.1 Impact of regional trade agreements in Africa

Now let us turn to the variables of interest. The first thing to note is that the dummy variable for the African RTAs are positive and significant (their impact is below that of the EU dummy, which is as expected in view of the EU's higher stage of integration. The estimates for RTA variables are measured relative to the reference category (No RTA). The ECOWAS dummy is positive and highly significant; its member states export 4.9 to 6.5 times[15] more to member states compared to the reference category of no RTA. SADC compared to ECOWAS seems to be doing better in terms of intra-regional trade, in that SADC causes member states to trade 6.2 to 10.4 times more compared to non-members. Typically the trade enhancing effect of regional integration is stronger than the impact of preferential trade with the EU. The empirical result re-enforces the earlier finding in Figure 3 where the comparative trend analysis indicates that SADC has a higher intra-regional export compared to ECOWAS.

Several factors may explain why SADC membership appears to have a stronger relative impact on the intra trade flows than ECOWAS membership. SADC exports are more diversified than in ECOWAS and the SADC protocol extends the tariff-free access to both primary and industrial goods whereas ECOWAS only covers unprocessed agricultural and traditional handicrafts. Indeed in the SADC trade protocol has a tariff reduction strategy that reflects the varying capacities of the individual economies. For instance, Mauritius consented to allow 65% of the import from SADC member states duty free as at 2000 and Tanzania at same time allowed only 9%, which has now been extended to 88% as at 2008.

5.2 Impact of overlapping membership

As shown in Table 9 the effect of overlapping membership has a positive impact in model 2, implicit in this model is the assumption that the differential effects of overlapping membership is constant irrespective of the bloc. The result in model 2 indicates that a pair of countries belonging to an additional RTA increases trade between them by 0.48%. However, the result in model 3 emphasizes that impact of overlapping membership differs considerably

[14] Chi-squared is 16.6 with a p-value of 0.16; all other tests reject the null hypothesis
[15] In interpreting the estimates from the models, the regression co-efficient for the dummy variables must be converted using formula ($\exp^{\beta}$ -1). The range is obtained from the different estimation methods.

between ECOWAS and SADC. Overlapping membership has had a significant positive impact for the ECOWAS but the impact is completely insignificant for SADC.

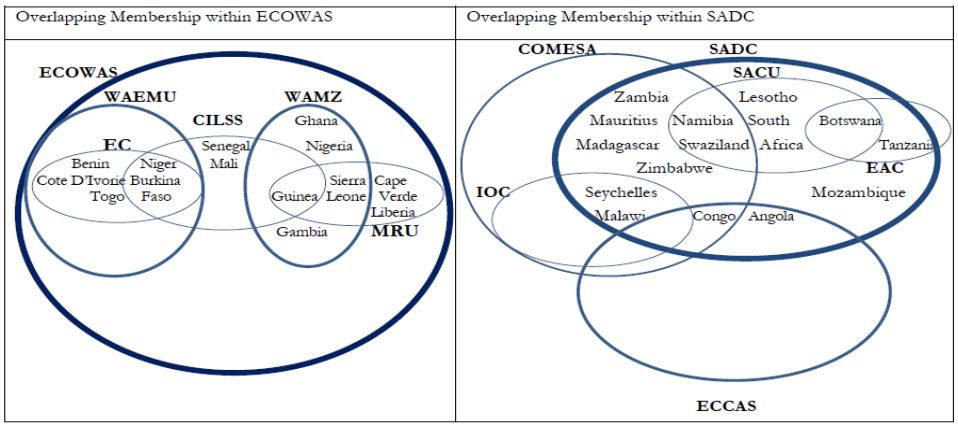
TABLE 9
Empirical results of multiple memberships

Variables	Model 2	Model 3
ECOWAS	1.136***	0.804***
	(0.152)	(0.158)
SADC	1.827***	2.364***
	(0.158)	(0.257)
EU	3.519***	3.911***
	(0.129)	(0.115)
ECOWAS_EU	0.955***	1.334***
	(0.107)	(0.0886)
SADC_EU	2.029***	2.422***
	(0.106)	(0.0878)
EU_ECOWAS	1.829***	2.216***
	(0.0958)	(0.0748)
EU_SADC	1.662***	2.055***
	(0.109)	(0.0901)
Mult_RTA	**0.398*** **	
	(0.0616)	
ECOWAS*Mult_RTA		**0.605*** **
		(0.0687)
SADC*Mult_RTA		**0.0572**
		(0.141)
Contingency	2.041***	1.991***
	(0.0940)	(0.0945)
Colonial ties	1.495***	1.501***
	(0.0850)	(0.0849)
Common currency	0.422***	0.422***
	(0.0916)	(0.0916)
Log distance	-0.241***	-0.247***
	(0.0586)	(0.0590)
Log Exporter GDP	0.437***	0.437***
	(0.119)	(0.119)
Log Importer GDP	0.138	0.138
	(0.103)	(0.103)
Log Exporter Population	1.671***	1.671***
	(0.558)	(0.558)
Log Importer Population	2.243***	2.243***
	(0.549)	(0.549)
Log Exporter Land Area	-1.030***	-1.037***
	(0.0131)	(0.0130)
Log Importer Land Area	-1.320***	-1.327***
	(0.0135)	(0.0137)
Constant	28.40***	28.62***
	(0.578)	(0.582)
Observations	10632	10632
R-squared	0.683	0.684

Robust standard errors in parentheses,*** p<0.01, ** p<0.05, * p<0.1

The interaction terms *ECOWAS*Mult_RTA* and *SADC*Mult_RTA*, capture the impact of overlapping memberships in ECOWAS and SADC respectively. For the ECOWAS, a pair of member states belonging to additional RTA increases trade between them by 0.83%. The positive impact under ECOWAS may be attributed to fact that, there are only two major sub-blocs that all the ECOWAS member states belong to WAEMU and WAMZ, these blocs are complementary to ECOWAS. Additionally, all the members of these two sub-blocs are all members of ECOWAS. For this reason, they may not impede or negate the performance of the ECOWAS (Figure 4 illustrates overlapping membership within ECOWAS and SADC).

FIGURE 4
Comparison of Overlapping Membership within ECOWAS and SADC



Source: based on Tables 1 and 2

Conversely, for SADC, among the regional blocs to which its' member states belong are COMESA, ECCAS and EAC, which are major RTAs in Southern, Eastern and Central Africa. There are many more members of these blocs who are non-SADC members. The insignificant impact of the overlapping membership within SADC indicates that belonging to an additional RTA does not increase bilateral trade. One reason may be that the other regional blocs' trade rules and regulations may undermine the full implementation of SADC trade rules and regulations for example because there are conflicting rules of origin.

5.3 Sensitivity analyses

We perform three sensitivity analyses: firstly, we run model 1 without including the PTA between the EU and the blocs (i.e. removing the EU countries from the list), secondly regarding the impact of the zero trade flows and thirdly regarding the impact of the dominant economies in each African RTA. Restricting model 1 to only ECOWAS and SADC RTAs, the result did emphasize the significant impact of the blocs on regional trade. The result for this model accentuated the better performance of SADC compared to ECOWAS. Table 10 below gives the impact of ECOWAS compared to SADC.

The zero flows are not used in the estimation of the models due to the logarithmic transformation (the log of zero is not defined). The exclusion of these zero-valued flows from the gravity model may result in biased estimates.

TABLE 10
Impact of ECOWAS and SADC RTAs

VARIABLES	Model 1
ECOWAS	1.154***
	(0.160)
SADC	2.092***
	(0.140)
Contingency	2.324***
	(0.139)
Common currency	0.231
	(0.753)
Log distance	-0.823***
	(0.0911)
Log Exporter GDP	0.378**
	(0.178)
Log Importer GDP	0.218
	(0.168)
Log Exporter Population	3.138**
	(1.527)
Log Importer Population	2.947*
	(1.643)
Log Exporter Land Area	-1.921***
	(0.0263)
Log Importer Land Area	-1.813***
	(0.0260)
Constant	50.89***
	(0.886)
Observations	4515
R-squared	0.751

Robust standard errors in parentheses,*** p<0.01, ** p<0.05, * p<0.1

Table 11 investigates the impact of the zero trade flows by substituting alternative values for the zero observations. Taking the zero flows into account increases the estimated parameters for the RTA dummies while their level of significance and sign in general remains unchanged. Thus, we conclude that in terms of significance of the RTAs, the exclusion of zero flows in the model would not substantially undermine the empirical results. For the coefficients of ECOWAS and SADC RTAs, the estimates (with the substituted arbitrary values) gets closer to estimates from original data as substituted value gets closer to zero.

TABLE 11
Zero trade flows

VARIABLES	Original data	Replacing zero flows with $1	Replacing zero flows with $0.5	Replacing zero flows with $0.05	Replacing zero flows with $0.01
ECOWAS	1.764***	0.695***	0.787***	1.091***	1.304***
	(0.122)	(0.0858)	(0.0842)	(0.0846)	(0.0896)
SADC	2.434***	1.094***	1.233***	1.695***	2.019***
	(0.128)	(0.0859)	(0.0863)	(0.0921)	(0.0996)
EU	3.915***	7.594***	7.659***	7.875***	8.026***
	(0.115)	(0.0888)	(0.0869)	(0.0857)	(0.0896)
ECOWAS_EU	1.338***	1.422***	1.647***	2.394***	2.917***
	(0.0885)	(0.0739)	(0.0727)	(0.0718)	(0.0739)
SADC_EU	2.418***	2.528***	2.811***	3.752***	4.409***
	(0.0877)	(0.0669)	(0.0660)	(0.0659)	(0.0684)
EU_ECOWAS	2.221***	3.141***	3.395***	4.240***	4.831***
	(0.0748)	(0.0530)	(0.0510)	(0.0470)	(0.0470)
EU_SADC	2.050***	3.020***	3.281***	4.146***	4.751***
	(0.0900)	(0.0661)	(0.0644)	(0.0615)	(0.0623)
Contingency	2.093***	1.420***	1.505***	1.788***	1.986***
	(0.0944)	(0.0919)	(0.0908)	(0.0908)	(0.0943)
Colonial ties	1.500***	1.945***	1.941***	1.931***	1.924***
	(0.0850)	(0.0591)	(0.0577)	(0.0551)	(0.0552)
Common currency	0.422***	0.775***	0.797***	0.871***	0.922***
	(0.0916)	(0.223)	(0.236)	(0.284)	(0.320)
Log distance	-0.230***	0.0755	0.0302	-0.120**	-0.225***
	(0.0588)	(0.0482)	(0.0480)	(0.0498)	(0.0530)
Log Exporter GDP	0.437***	0.420***	0.402***	0.339***	0.295***
	(0.119)	(0.110)	(0.107)	(0.102)	(0.105)
Log Importer GDP	0.138	0.0877	0.0990	0.136	0.162*
	(0.103)	(0.0965)	(0.0923)	(0.0874)	(0.0929)
Log Exporter Population	1.671***	-0.987*	-0.817*	-0.254	0.140
	(0.558)	(0.513)	(0.490)	(0.460)	(0.487)
Log Importer Population	2.243***	0.494	0.512	0.569	0.609
	(0.549)	(0.535)	(0.514)	(0.488)	(0.513)
Log Exporter Land Area	-1.034***	0.618***	0.531***	0.241***	0.0385***
	(0.0133)	(0.00957)	(0.00940)	(0.00943)	(0.0100)
Log Importer Land Area	-1.323***	-0.219***	-0.223***	-0.236***	-0.245***
	(0.0135)	(0.00904)	(0.00887)	(0.00901)	(0.00972)
Constant	28.40***	-7.311***	-5.990***	-1.599***	1.469***
	(0.580)	(0.492)	(0.489)	(0.502)	(0.532)
Observations	10632	13624	13624	13624	13624
Adjusted R-squared	0.682	0.564	0.570	0.585	0.587

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

The effects of larger economies, Nigeria in ECOWAS and South Africa[16] in SADC, are major concern as these economies can influence the results to a large extent. Table 12 analyses if the results are driven by the two dominant economies in each trading block (Nigeria and South Africa). Again the signs and significance levels are comparable in the models 1 and 2; however, for

[16] Data on South Africa composed of South Africa, Botswana, Namibia, Swaziland and Lesotho because the IMF DOT sums these countries as one.

model 3, overlapping membership in SADC differs only in significance compared to the model for all countries.

TABLE 12
Estimates of models with and without Nigeria and South Africa

	All countries			**All countries (without Nigeria & South Africa)**		
VARIABLES	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
ECOWAS	**1.764*** **	1.136***	0.804***	**2.111*** **	1.071***	1.206***
	(0.122)	(0.152)	(0.158)	**(0.133)**	(0.169)	(0.175)
SADC	**2.434*** **	1.827***	2.364***	**1.943*** **	0.899***	-0.120
	(0.128)	(0.158)	(0.257)	**(0.138)**	(0.170)	(0.263)
EU	**3.915*** **	3.519***	3.911***	**3.469*** **	2.831***	3.441***
	(0.115)	(0.129)	(0.115)	**(0.124)**	(0.140)	(0.123)
ECOWAS_EU	**1.338*** **	0.955***	1.334***	**1.557*** **	0.954***	1.566***
	(0.0885)	(0.107)	(0.0886)	**(0.0954)**	(0.114)	(0.0953)
SADC_EU	**2.418*** **	2.029***	2.422***	**2.498*** **	1.888***	2.511***
	(0.0877)	(0.106)	(0.0878)	**(0.0940)**	(0.112)	(0.0942)
EU_ECOWAS	**2.221*** **	1.829***	2.216***	**2.223*** **	1.603***	2.231***
	(0.0748)	(0.0958)	(0.0748)	**(0.0810)**	(0.102)	(0.0809)
EU_SADC	**2.050*** **	1.662***	2.055***	**1.758*** **	1.148***	1.773***
	(0.0900)	(0.109)	(0.0901)	**(0.0977)**	(0.115)	(0.0978)
Mult_RTA		**0.398*** **			**0.626*** **	
		(0.0616)			**(0.0632)**	
ECOWAS*Mult_RTA			**0.605*** **			**0.533*** **
			(0.0687)			**(0.0722)**
SADC*Mult_RTA			**0.0572**			**1.216*** **
			(0.141)			**(0.133)**
Contingency	2.093***	2.041***	1.991***	2.059***	1.980***	2.029***
	(0.0944)	(0.0940)	(0.0945)	(0.0992)	(0.0988)	(0.0993)
Colonial ties	1.500***	1.495***	1.501***	1.670***	1.664***	1.664***
	(0.0850)	(0.0850)	(0.0849)	(0.0901)	(0.0900)	(0.0900)
Common currency	0.422***	0.422***	0.422***	0.442***	0.442***	0.442***
	(0.0916)	(0.0916)	(0.0916)	(0.0941)	(0.0941)	(0.0941)
Log distance	-0.230***	-0.241***	-0.247***	-0.385***	-0.410***	-0.413***
	(0.0588)	(0.0586)	(0.0590)	(0.0606)	(0.0603)	(0.0597)
Log Exporter GDP	0.437***	0.437***	0.437***	0.435***	0.435***	0.435***
	(0.119)	(0.119)	(0.119)	(0.125)	(0.125)	(0.125)
Log Importer GDP	0.138	0.138	0.138	0.0884	0.0884	0.0884
	(0.103)	(0.103)	(0.103)	(0.110)	(0.110)	(0.110)
Log Exporter Population	1.671***	1.671***	1.671***	2.024***	2.024***	2.024***
	(0.558)	(0.558)	(0.558)	(0.587)	(0.587)	(0.587)
Log Importer Population	2.243***	2.243***	2.243***	2.535***	2.535***	2.535***
	(0.549)	(0.549)	(0.549)	(0.558)	(0.558)	(0.558)
Log Exporter Land Area	-1.034***	-1.030***	-1.037***	-1.310***	-1.306***	-1.296***
	(0.0133)	(0.0131)	(0.0130)	(0.0141)	(0.0138)	(0.0136)
Log Importer Land Area	-1.323***	-1.320***	-1.327***	-1.497***	-1.497***	-1.487***
	(0.0135)	(0.0135)	(0.0137)	(0.0146)	(0.0144)	(0.0145)
Constant	28.40***	28.40***	28.62***	34.70***	34.85***	34.63***
	(0.580)	(0.578)	(0.582)	(0.606)	(0.601)	(0.592)
Observations	10632	10632	10632	9321	9321	9321
R-squared	0.682	0.683	0.684	0.739	0.742	0.744

Robust standard errors in parentheses,*** p<0.01, ** p<0.05, * p<0.1

6 Conclusions and policy implications

This Working Paper finds that the two major regional trade agreements in Africa have had a positive and significant impact on bilateral intra-RTA trade.[17] The relative impact of regional trade agreements is stronger than the trade stimulating impact of preferential trade agreement with the European Union. In this sense this paper shows the importance of regional trade agreements for the African continent. The results from this study at a more general level

[17] Note that this finding also provides an update of the findings reported in Table 5 for the period 2000-2006 that is included in our data set, but not in those studies.

indicate that developing countries may be able to significantly improve their trade performance if they can focus on expanding and integrating regional markets and use this 'internal market' as a training ground to improve their efficiency and competiveness in order to compete favourably at the global level.

The paper, however, also clarifies that the spaghetti bowl of RTAs in Africa may undermine their effectiveness. Here we are able to contrast the ECOWAS and SADC approach to regional integration. The ECOWAS approach provides an umbrella that embraces smaller and lower regional integration initiatives (much like the Benelux custom's union is still part of the Europe's internal market). In this approach overlapping multi-RTA membership does not provide a problem. In contrast in the SADC approach we have a hub and spokes setting and therefore inconsistencies that hamper the RTA's effectiveness are likely to occur (and indeed according to our estimates this actually happens to be the case). Essentially we therefore find a positive impact if an additional membership complements the integration process of the original RTA and this provides a clear lesson for the direction into which regional trade agreements could be broadened and strengthened.

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Appendix - List of countries

	Country	RTAs
1	Angola	SADC
2	Belgium	EU
3	Benin	ECOWAS
4	Burkina Faso	ECOWAS
5	Cape Verde	ECOWAS
6	Congo-DR	SADC
7	Côte d'Ivoire	ECOWAS
8	France	EU
9	Gambia, The	ECOWAS
10	Germany	EU
11	Ghana	ECOWAS
12	Guinea	ECOWAS
13	Guinea-Bissau	ECOWAS
14	Ireland	EU
15	Italy	EU
16	Liberia	ECOWAS
17	Madagascar	SADC
18	Malawi	SADC
19	Mali	ECOWAS
20	Mauritius	SADC
21	Mozambique	SADC
22	The Netherlands	EU
23	Niger	ECOWAS
24	Nigeria	ECOWAS
25	Portugal	EU
26	Senegal	ECOWAS
27	Seychelles	SADC
28	Sierra Leone	ECOWAS
29	South Africa	SADC
30	Spain	EU
31	Tanzania	SADC
32	Togo	ECOWAS
33	United Kingdom	EU
34	Zambia	SADC
35	Zimbabwe	SADC